

Claims

- [c1] 1. A method of preventing cathode break in an active matrix organic light emitting diode device, comprising the steps of:
providing a substrate, wherein the substrate has an array of thin film transistors and each thin film transistor further includes a gate electrode, a channel layer, a source terminal and a drain terminal;
forming a passivation layer over the substrate covering the thin film transistors;
planarizing the passivation layer;
forming an opening in the passivation layer that exposes the drain terminal;
forming an anode layer over the passivation layer and the interior of a portion the opening;
forming a light emitting layer over the substrate covering the anode layer; and
forming a cathode layer over the light emitting layer.
- [c2] 2. The method of claim 1, wherein material constituting the passivation layer includes dielectric resin.
- [c3] 3. The method of claim 1, wherein material constituting the anode layer includes indium-tin-oxide.
- [c4] 4. The method of claim 1, wherein material constituting the light emitting layer includes an organic compound capable of emitting light.
- [c5] 5. A method of preventing cathode break in an active matrix organic light emitting diode device, comprising the steps of:
providing a substrate, wherein the substrate has an array of thin film transistors and each thin film transistor further includes a gate electrode, a channel layer, a source terminal and a drain terminal, and the anode layer and the source terminal are electrically connected; *A*
forming a patterned passivation layer over the substrate covering the thin film transistors but exposing a portion of the anode layer;
forming a patterned photosensitive layer over the substrate, covering the passivation layer and smoothing out the upper surface of the passivation layer;
forming a light emitting layer over the photosensitive layer and the anode layer;
and

forming a cathode layer over the light emitting layer.

- [c6] 6. The method of claim 5, wherein material constituting the passivation layer includes silicon nitride.
- [c7] 7. The method of claim 5, wherein the same photomask is used for patterning the photosensitive layer and the passivation layer.
- [c8] 8. The method of claim 5, wherein material constituting the anode layer includes indium-tin-oxide.
- [c9] 9. The method of claim 5, wherein material constituting the light emitting layer includes an organic compound capable of emitting light.
- [c10] 10. A method of preventing cathode break in an active matrix organic light emitting diode device through a process of rounding the corners of the source/drain terminal of a thin film transistor, the method comprising the steps of:
forming a conductive layer over the substrate;
forming a patterned photoresist layer over the conductive layer;
conducting a dry etching operation using the photoresist layer as an etching mask to form the source/drain pattern of the thin film transistor, wherein the source/drain pattern has a sloping profile at each end; and
removing the photoresist layer.
- [c11] 11. The method of claim 10, wherein the gaseous reactant used in the dry etching operation is a gaseous mixture of SF_6 and O_2 and that the SF_6/O_2 ratio is between 0.5~1.0. *A*
- [c12] 12. The method of claim 10, wherein the gaseous reactant used in the dry etching operation is a gaseous mixture of C_2F_4 and BCl_3 and the $\text{C}_2\text{F}_4/\text{BCl}_3$ ratio is between 0.4~0.8.
- [c13] 13. The method of claim 10, wherein the conductive layer is a titanium/aluminum/titanium composite layer.
- [c14] 14. The method of claim 10, wherein the conductive layer is made of

molybdenum.

- [c15] 15. A method of preventing cathode break in an active matrix organic light emitting diode device through a process of rounding the corners of the source/drain terminal of a thin film transistor, the method comprising the steps of:
- forming a conductive layer over the substrate; and
- conducting an etching operation to form the source/drain pattern of the thin film transistor, wherein the source/drain pattern has a sloping profile at each end.
- [c16] 16. The method of claim 15, wherein the step of forming the source/drain pattern includes the sub-steps of:
- forming a patterned first photoresist layer over the conductive layer;
- conducting a first etching operation using the first photoresist layer as an etching mask to remove a definite thickness of the conductive layer;
- removing a definite thickness from the first photoresist layer to form a second photoresist layer; and
- conducting a second etching operation using the second photoresist layer as an etching mask to form the source/drain pattern.
- [c17] 17. The method of claim 16, wherein the step of removing a definite thickness of the first photoresist layer includes conducting an ashing operation using oxygen plasma.
- [c18] 18. A method of preventing cathode break in an active matrix organic light emitting diode device through a process of rounding the corners of the source/drain terminal of a thin film transistor, the method comprising the steps of:
- forming a conductive layer over the substrate; and
- conducting an etching operation to form the source/drain pattern of the thin film transistor, wherein the etchant for the etching operation is $\text{HNO}_3 / \text{H}_3\text{PO}_4 / \text{CH}_3\text{COO}$, and the weight percentage of HNO_3 in the etchant is between 0.1~0.2.

[c19]

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~~19~~. A method of preventing cathode break in an active matrix organic light emitting diode device, comprising the steps of:
 providing a substrate, wherein the substrate has an array of thin film transistors and each thin film transistor further includes a gate electrode, a channel layer, a source terminal and a drain terminal;
 forming an anode layer over the substrate in positions corresponding to each thin film transistor, wherein the anode layer and the source terminal are electrically connected;
 forming a light emitting layer and a cathode layer over the substrate covering the thin film transistors and the anode layer; and
 forming a repair conductive layer over the cathode layer to repair a broken cathode layer.

[c20]

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~~20~~. The method of claim ~~19~~, wherein the repair conductive layer is formed by conducting a sputtering process.

[c21]

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~~21~~. The method of claim ~~19~~, wherein the repair conductive layer is formed by conducting an evaporation-deposition process before a sputtering process.

[c22]

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~~22~~. The method of claim ~~19~~, wherein the repair conductive layer is formed by conducting an electron beam evaporation-deposition process before a sputtering process.

[c23]

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~~23~~. The method of claim ~~19~~, wherein the repair conductive layer and the anode layer are made from the same material.

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Figures